This MANU-SPEC® utilizes the Construction Specifications Institute (CSI) Manual of Practice®, including MasterFormat™, SectionFormat™, and PageFormat™. A MANU-SPEC® is a manufacturer-specific proprietary product specification using the proprietary method of specifying applicable to project specifications and master guide specifications. Text indicated by brackets [ ] that appear in blue is optional and can be deleted in the final copy of this specification. Items that appear in red text are Specifier Notes.

This MANU-SPEC® specifies resilient vinyl sheet flooring, marketed under the Eternal Material and Eternal Wood brand names, as manufactured by Forbo Flooring. Revise the MANU-SPEC® section number and title below to suit project requirements, specification practices, and section content. Refer to CSI MasterFormat™ for other section numbers and titles, including 09 60 00 Flooring; 09 65 00 Resilient Flooring.

**SECTION 09 65 16**

**VINYL SHEET FLOORING**

1. **GENERAL**
	1. **RELATED DOCUMENTS**
		1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
	2. **SUMMARY**
		1. This section includes the following Vinyl Sheet Flooring:
			1. Eternal Material and Eternal Wood

*Specifier Note: Revise paragraph below to suit project requirements. Add section numbers and titles per CSI MasterFormat™ and specifier's practice.*

* + 1. Sections related to this section include:
			1. Concrete: Refer to Division 3 Concrete Sections for cast‑in‑place concrete, concrete toppings, and cementitious underlayments.
			2. Wood Subflooring: Refer to Division 6 Carpentry Section for wood subflooring and wood underlayment.
			3. Finishes: Refer to Division 9 Finishes Section for maintenance of flooring.
			4. Resilient Flooring Accessories: Refer to Division 9 Finishes Sections for resilient wall bases, reducer strips, metal edge strips and other resilient flooring accessories.
			5. Expansion Joint Covers: Refer to Division 10 Specialties Section for expansion joint covers to be used with resilient flooring.

*Specifier Note: Article below may be omitted when specifying manufacturer's proprietary products and recommended installation. Retain Reference Article when specifying products and installation by an industry reference standard. If retained, list standard(s) referenced in this section. Indicate issuing authority name, acronym, standard designation and title. Establish policy for indicating edition date of standard referenced. "Conditions of the Contract" or Division 1 References Section may establish the edition date of standards. This article does not require compliance with standard, but is merely a listing of references used. Article below should list only those industry standards referenced in this section.*

* 1. **REFERENCES**
		1. Forbo Technical Data Sheets
		2. Forbo Installation Guide
		3. Forbo Floor Care Guide
		4. Safety Data Sheets (MSDS or SDS)
		5. American Society for Testing and Materials (ASTM):
	2. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials
	3. ASTM E 492 – Standard Test Method for Laboratory Measurement of lmpact Sound Transmission through Floor-Ceiling Assemblies Using the Tapping Machine
	4. ASTM E 648 – Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
	5. ASTM E 662 – Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
	6. ASTM E 989 – Standard Classification for Determination of lmpact lnsulation Class (llC)
	7. ASTM E 1745 – Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs
	8. ASTM F 141 – Standard Terminology Relating to Resilient Floor Coverings
	9. ASTM F 710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
	10. ASTM F 1303 – Standard Specification for Vinyl Sheet Floor Covering with Backing
	11. ASTM F 1482 – Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring
	12. ASTM F 1861 – Standard Specification for Resilient Wall Base
	13. ASTM F 1869 – Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
	14. ASTM F 2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
	15. ASTM F 2419 – Standard Practice for Installation of Thick Poured Gypsum Concrete Underlayments and Preparation of the Surface to Receive Resilient Flooring
	16. ASTM F 2471 – Standard Practice for Installation of Thick Poured Lightweight Cellular Concrete Underlayments and Preparation of the Surface to Receive Resilient Flooring
	17. ASTM F 2678 – Standard Practice for Preparing Panel Underlayments, Thick Poured Gypsum Concrete Underlayments, Thick Poured Lightweight Cellular Concrete Underlayments, and Concrete Subfloors with Underlayment Patching Compounds to Receive Resilient Flooring
	18. ASTM F 3191 – Standard Practice for Field Determination of Substrate Water Absorption (Porosity) for Substrates to Receive Resilient Flooring

F. National Fire Protection Association (NFPA):

* + - 1. NFPA 253 – Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
			2. NFPA 258 – Test Method for Specific Optical Density of Smoke Generated by Solid Materials

G. Standards Council of Canada:

1. CAN/ULC S102 – Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

*Specifier Note: Article below includes submittal of relevant data to be furnished by Contractor before, during, or after construction. Coordinate this article with Architect's and Contractor's duties and responsibilities in "Conditions of the Contract" and Division 1 Submittal Procedures Section.*

* 1. **SUBMITTALS**
		1. General: Submit each item in this Article according to the "Conditions of the Contract" and Division 1 Specification Sections.
		2. Product Data: Submit three (3) copies of the manufacturer’s technical data and installation recommendations for each type of flooring and accessory products specified.
		3. Shop Drawings:
			1. Submit shop drawings showing layout, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
			2. Show details of profiles and product components, including anchorage, accessories, finish colors, patterns and textures.
		4. Samples: Submit three (3) sets of samples of each type, color and finish of flooring and accessory products specified, with an indication of full range of color, pattern and texture variation. Provide samples with a minimum size of 6” x 9” for flooring products and 6” in length for accessories.
		5. Quality Assurance Submittals:
			1. Submit three (3) copies of the manufacturer’s Product Technical Data Sheet, specifying performance characteristics, criteria and physical requirements.
			2. Submit three (3) copies of the manufacturer's written installation recommendations.
		6. Closeout Submittals:
			1. Submit three (3) copies of the maintenance and operations data. This should include methods for maintaining the installed products and any precautions against cleaning materials or methods that are detrimental to the product and their performance.
			2. Submit three (3) copies of the warranty as specified herein.
			3. Installer Certification: Submit proof of certification from the manufacturer certifying that the installers comply with the specified requirements.
		7. Replacement Material: After completion of work, deliver to project site replacement materials from the same manufactured lot as materials installed. Package materials with protective covering and identify each with descriptive labels.
			1. Flooring Materials: No less than 50 square feet of each type, pattern and color installed.
			2. Accessories: No less than 10 linear feet for each 500 linear feet or fraction thereof each different type and color installed.
		8. [Sustainable Submittals:
			1. Product Data for Credit MR 2.1 and Credit MR 2.2: Construction Waste Management as required by Division 01. (LEED 2009)
			2. Product Data for Credit MR 4.1 and Credit MR 4.2: For products having recycled content, documentation indicating percentages by weight of post-consumer and pre-consumer recycled content. (LEED 2009, LEED v4)
				1. Include statement indicating costs for each product having recycled content.
			3. Product Data for Credit MR 6: For products having Rapidly Renewable content, documentation indicating percentages by weight of Rapidly Renewable content as required by Division 01.
				1. Include statement indicating costs for each product having Rapidly Renewable content. (LEED 2009)
			4. Product Data for Credit EQ 4.1: Low-Emitting Materials – Adhesives and Sealants, including printed statement of VOC content as required by Division 01. (LEED 2009)
			5. Product Data for Indoor Environmental Quality Credit Low-Emitting Materials – Flooring products must be tested and determined compliant in accordance with California Department of Public Health (CDPH) Standard Method v1.2, using the applicable exposure scenario. The default scenario is the private office scenario. If a product specified has not been tested as noted, provide a substitution to the Architect for review and approval of an equal product meeting the noted California Department of Health standard. (LEED 2009, LEED v4)
			6. Building Product Disclosure and Optimization – Environmental Product Declarations; Products must meet one of the disclosure criteria: (LEED v4)
				1. Product-specific Type III EPD – Products with third-party certification (Type III)
				2. Industry-wide (generic) EPD – Products with third-party certification (Type III)
				3. Product-specific declaration – Products with a publicly available, critically reviewed life-cycle assessment conforming to ISO 14044)
			7. Building Product Disclosure and Optimization – Sourcing of Raw Materials; Option 2 – Leadership Extraction Practices, products containing one or more of the following attributes: (LEED v4)
				1. Reused materials
				2. Post-consumer recycled materials
				3. Pre-consumer recycled materials
				4. Extended producer responsibility
			8. Building Product Disclosure and Optimization – Material Ingredients; Option 1 – Material Ingredient Reporting Health, products using any of the following programs: (LEED v4)
				1. Product Declaration (HPD)
				2. Declare Label
				3. Cradle to Cradle v2 Basic level
				4. Cradle to Cradle v3 Bronze level
			9. Emissions and Content Requirements General Emissions Evaluation: Building products must be tested and determined compliant in accordance with California Department of Public Health (CDPH) Standard Method v1.2, using the applicable exposure scenario – flooring. (LEED v4)
			10. Additional VOC Content Requirements for Wet-Applied Products: All adhesives and sealants wet-applied on site must meet the applicable chemical content requirements of SCAQMD Rule 1168 – July 1, 2005. (LEED v4)]

*Specifier Note: Article below should include prerequisites, standards, limitations, and criteria which establish an overall level of quality for products and workmanship for this section. Coordinate below article with Division 1 Quality Assurance Section.*

* 1. **QUALITY ASSURANCE**
		1. Manufacturer: Whenever possible, provide each type of flooring as provided by a single manufacturer, including recommended primers, adhesives, sealants, patching and leveling compounds.

*Specifier Note: Coordinate paragraph below with Division 1 Project Management and Coordination (Project Meetings) Section.*

* + 1. Pre-Installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation and floor care recommendations and manufacturer's warranty requirements. Comply with requirements according to the “Project Management and Coordination” in Division 1 Project Meetings Section.
		2. Pre-Installation Testing: Conduct and document pre-installation testing as specified by manufacturer in accordance with the latest version of the specified test methods.
			1. Substrate Porosity Testing: ASTM F 3131 – Standard Practice for Field Determination of Substrate Water Absorption (Porosity) for Substrates to Receive Resilient Flooring.
			2. pH testing: ASTM F 710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
			3. In-situ Relative Humidity Testing: ASTM F 2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
			4. Calcium Chloride Testing: ASTM F 1869 – Standard Test Method for Measuring Moisture Vapor Emissions Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
			5. Bond Testing: Conduct testing and document results in accordance with the manufacturer’s recommendations.
		3. Flooring Contractor Qualifications:
			1. The awarded flooring contractor shall be an established firm, experienced in the installation of the specified product and shall have access to all manufacturer’s required specifications, technical, installation and maintenance related documents.
		4. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
			1. Engage installers certified by Forbo as a “Forbo Certified Sheet Technician.”
			2. Proof of valid certification must be submitted to the General Contractor and verified by Forbo prior to the start of the project.
				1. [For complex installations including flash coving, a Forbo 360 Master Mechanic is required.]
			3. Forbo Certified Sheet Technicians must be present on the jobsite daily.

*Specifier Note: Paragraph below should list obligations for compliance with specific code requirements particular to this section. General statements to comply with a particular code are typically addressed in "Conditions of the Contract" and Division 1 Regulatory Requirements Section. Repetitive statements should be avoided.*

* + 1. Regulatory Requirements: Provide flooring products with the following fire performance characteristics as determined by testing identical products in accordance with the latest version of ASTM method indicated below by a certified testing laboratory or another testing and inspecting agency acceptable to authorities having jurisdiction.
			1. ASTM E 648 – Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source or NFPA 253 – Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
			2. ASTM E 662 – Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials or NFPA 258 – Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
			3. [CAN/ULC S102 – Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies. (Canada Test Method Only)]

*Specifier Note: Retain paragraph below for erected assemblies (either on-site or off-site) required for review of construction, coordination of work of several sections, testing, or observation of operation. Mock-ups, when accepted or approved, establish standards by which work will be judged. Coordinate below with Division 1 Quality Control (Mock-Up Requirements) Section.*

* + 1. Standard of Quality Mock-Up: For the purpose of evaluating the quality of workmanship, install a mock-up of the specified flooring completed by the pre-qualified installers following the manufacturer’s installation recommendations. Obtain Owner's and Architect's acceptance of finish color, texture and pattern, and workmanship standard. Comply with requirements according to the “Quality Control” in Division 1 Mock-Up Requirements Section.
			1. Size and Location of Mock-Up: [Specify the size and location of the mock-up.]
			2. Maintenance of Mock-Up: Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.
			3. Approval of Mock-Up: Upon approval of the mock-up, this installation shall be considered the standard of quality and basis of comparison for the balance of the project. Areas to be found deficient by specification standards or application procedures shall be repaired or replaced at the contractor’s expense.
			4. Incorporation of Mock-Up: The mock-up may be incorporated into final construction upon Owner's approval.
		2. Post-Installation Meetings: Conduct post-installation meetings to review methods and procedures related to floor care and warranty requirements.

*Specifier Note: Coordinate article below with "Conditions of the Contract" and with Division 1 Closeout Submittals Warranty Section. Below warranty article assumes the use of The American Institute of Architects document A201 "Conditions of the Contract for Construction." If other "Conditions" are used for the project, revise article below accordingly.*

* 1. **WARRANTY**
		1. Project Warranty: Comply with requirements according to the "Conditions of the Contract" in Division 1 Closeout Submittals Warranty Section for project warranty provisions.
		2. Manufacturer's Warranty: Submit the manufacturer's standard warranty document executed by authorized company official for Owner's acceptance. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.
			1. Warranty Period: Ten (10) year limited warranty commencing on Date of Original Purchase from manufacturer.
		3. Installation Warranty: Submit the flooring contractor’s installation warranty signed by the General Contractor and Installer for Owner’s Acceptance, agreeing to repair or replace work which has failed a as result of defects in workmanship. Failure shall include, but not limited to, tearing, cracking, separation, deterioration or loosening from substrate, seam failure, ripples, bubbling or puckering. Upon notification of such installation deficiencies, within the warranty period, make necessary repairs or replacement at the convenience of the Owner. Other guaranties or warranties may not be substituted by the Contractor for the terms of this warranty. Installation warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents
			1. Warranty Period: Two (2) year limited warranty commencing on Date of Substantial Completion from flooring contractor.

*Specifier Note: Article below should include special and unique requirements. Coordinate article below with Division 1 Product Requirements Section.*

* 1. **DELIVERY, STORAGE, AND HANDLING**
		1. General: Comply with the Division 1 Product Requirements Sections.
		2. Ordering: Comply with the manufacturer's ordering instructions and lead time requirements to avoid construction delays.
		3. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
		4. Storage and Protection: Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
			1. All materials (flooring, adhesives, weld rod and accessories) should be stored in areas that are fully enclosed and weathertight. The permanent HVAC should be fully operational and controlled and set at a minimum temperature 65° F (18.3° C). If this is not possible, the areas should be acclimated and controlled by means of temporary HVAC to the service level conditions expected during occupancy. The temperature and humidity should range from 75° F ± 10°F (23.9° C ±
			5.5° C) with a 50% ± 10% ambient relative humidity.
			2. Store rolls standing upright, labels up, and ensure that the color, roll and batch numbers can be easily read.
			3. Comply with the manufacturer’s recommendation for the acclimation of all materials in the space where they will be installed for at least 48 hours prior to the installation unless longer conditioning periods are required by the manufacturer.
	2. **PROJECT CONDITIONS**
		1. Environmental Requirements/Conditions:
			1. Areas to receive material should be clean, fully enclosed and weather tight. The permanent HVAC should be fully operational and controlled and set at a minimum temperature 65° F
			(18.3° C). If this is not possible, the areas should be acclimated and controlled by means of temporary HVAC to the service level conditions expected during occupancy. The temperature and humidity should range from 75° F ± 10°F (23.9° C ± 5.5° C) with a 50% ± 10% ambient relative humidity. These conditions **MUST** be established at least seven days prior to beginning the installation, maintained during the installation, and continued for at least seven days following the installation.
			2. The flooring material should be conditioned in the same manner for at least 48 hours prior to the installation.
			3. Substrate evaluation and preparation should not begin until a stable, conditioned environment has been established as described in this section.
			4. Areas to receive flooring must have adequate lighting to allow for proper inspection and preparation of the substrate, installation of the flooring and final inspection.
		2. Temperature Requirements: Maintain air temperature in spaces where products will be installed for time period before, during, and after installation as recommended by manufacturer.
			1. Temperature Conditions: 65° F (18.3° C) for at least seven days prior to beginning the installation, maintained during the installation, and continued for at least seven days following the installation.
		3. Substrate Conditions:
			1. Existing Conditions: [Specify existing conditions affecting product use and installation.]
			2. Concrete Curing: Do not install flooring over concrete substrates until substrates have cured and are dry to bond with adhesive as determined by the concrete and flooring manufacturer's recommendations.
				1. [Owner assigned responsibility.]
				2. [Flooring Contractor assigned to report responsibility back to Owner and/or Architect.]
			3. Testing Results: Conduct and document pre-installation testing as specified by manufacturer in accordance with the latest version of the specified test methods.
				1. Substrate Porosity Testing: ASTM F 3131 – Standard Practice for Field Determination of Substrate Water Absorption (Porosity) for Substrates to Receive Resilient Flooring.
				2. pH testing: ASTM F 710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
				3. In-situ Relative Humidity Testing: ASTM F 2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
				4. Calcium Chloride Testing: ASTM F 1869 – Standard Test Method for Measuring Moisture Vapor Emissions Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
				5. Bond Testing: Conduct testing and document results in accordance with the manufacturer’s recommendations.
			4. Close spaces to traffic during flooring installation and for time period after installation recommended in writing by the manufacturer.
			5. Installation should not begin until the work of all other trades has been completed, especially overhead trades.
			6. Where demountable partitions and other items are indicated for installation on top of flooring material, install flooring material before these items are installed.
		4. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.
1. **PRODUCTS**

*Specifier Note: Retain article below for proprietary method specification. Add product attributes performance characteristics, material standards, and descriptions as applicable. Use of such phrases as "Equal" or "Approved Equal," or similar phrases may cause ambiguity in specifications. Such phrases require verification (procedural, legal, and regulatory) and assignment of responsibility for determining "Equal" products.*

* 1. **VINYL SHEET FLOORING – FORBO FLOORING SYSTEMS**
		1. Manufacturer Address:
			1. [US Headquarters

8 Maplewood Dr.

Hazleton, PA 18202

Phone: 1-800-842-7839

[www.forboflooringNA.com](http://www.forboflooringNA.com)]

* + - 1. [Canada Headquarters

3983 Nashua Dr., Unit 1

Mississauga, ON L4V 1P3

Phone: 1-800-268-8108

[www.forboflooringNA.com](http://www.forboflooringNA.com)]

* + - 1. Representative Contact: [Specify representative name and contact information.]
		1. Proprietary Product Information:
			1. Material Name: Eternal [Material] [Wood]
			2. Description: Highly compressed homogeneous vinyl wear layer with a high performance urethane top coat. A glass fiber interlayer, to ensure dimensional stability, and a calendared CDF backing support the wear layer.
			3. Wear Layer: 0.7mm (0.0275”)
			4. Width: 2 Meters (79")
			5. Length: 25 Meters (82 Linear Feet)
			6. Gauge: 2.0mm (0.080”)
			7. Color and Pattern: Colors and patterns shall be selected by Architect. Patterns shall be defined in any given area, applied in stripes, diagonals, checkerboard pattern and other designs as determined by the Architect. All selections shall be made from the manufacturer’s full product lines (including premium colors). See Architectural drawings for color schedule list in reference to this material.
				1. [Specify colors and patterns as selected by Architect.]
			8. Adhesive: [Forbo V 885 Adhesive] [Forbo 660 Adhesive]
			9. Seams: All Eternal sheet products shall be installed utilizing net fit seams and heat welded the day following installation.
				1. Welding Rod: Forbo Eternal color-matched welding rod as selected by Architect from manufacturer’s standard patterns and colors.
	1. **ACCESSORIES**
		1. Resilient Edge Strips: Strips shall be homogeneous vinyl or rubber composition with a tapered or bull nose edge no less than 1” wide, colored to match flooring or as selected by Architect from standard colors available.
			1. [Specify colors and patterns as selected by Architect.]
		2. Metal Edge Strips: Strips shall be of width shown and of required thickness to protect the exposed edge of the flooring with units in maximum length available to minimize the number of joints.
			1. [Specify colors and patterns as selected by Architect.]
		3. Wall Base: Provide rubber wall base complying with FS SS-W-40, Type I.
			1. [Specify colors and patterns as selected by Architect.]
		4. Floor Care Products: Provide products as required in Section 3.7 Cleaning.
			1. [Specify cleaning chemicals and equipment as recommended by manufacturer.]

*Specifier Note: Edit article below to suit project requirements. If substitutions are permitted, edit text below. Add text to refer to Division 1 Project Requirements (Product Substitutions Procedures) Section.*

* 1. **PRODUCT SUBSTITUTIONS**
		1. Substitutions: No substitutions permitted.

*Specifier Note: Add article below for alternates required for project; state work covered. Coordinate with Part 1 General Summary Article herein, applicable Division 1 Sections, and other Bid and Contract Documents.*

* 1. **RELATED MATERIALS**
		1. Related Materials: Refer to other sections for related materials as follows.
			1. Concrete: Refer to Division 3 Concrete Sections for cast‑in‑place concrete, concrete toppings, and cementitious underlayments.
			2. Wood Subflooring: Refer to Division 6 Carpentry Section for wood subflooring and wood underlayment.
			3. Finishes: Refer to Division 9 Finishes Section for maintenance of flooring.
			4. Resilient Flooring Accessories: Refer to Division 9 Finishes Sections for resilient wall bases, reducer strips, metal edge strips and other resilient flooring accessories.
			5. Expansion Joint Covers: Refer to Division 10 Specialties Section for expansion joint covers to be used with resilient flooring.
	2. **SOURCE QUALITY**
		1. Source Quality: Obtain flooring product materials from a single manufacturer.
1. **EXECUTION**

*Specifier Note: Article below is an addition to the CSI SectionFormat and a supplement to MANU-SPEC®. Revise article below to suit project requirements and specifier's practice.*

* 1. **MANUFACTURER'S RECOMMENDATIONS**
		1. Compliance: Comply with manufacturer's product technical data, including product technical bulletins, installation recommendations and floor care recommendations.
	2. **INSPECTION**
		1. Site Verification of Conditions: The Flooring Contractor and Installer shall examine and verify conditions previously described in other sections under which flooring and accessories are to be installed to be in accordance with the manufacturer’s installation recommendations and must notify the General Contractor in writing of conditions detrimental to proper and timely completion of work. Work shall not proceed until all unsatisfactory conditions are corrected to acceptable conditions to the Owner and Architect.
		2. Material Inspection: Visually inspect all materials prior to installation in accordance with the manufacturer’s installation recommendations. Material with visual defects shall not be installed and shall not be considered as a legitimate claim if they are installed.
	3. **PREPARATION**
		1. General: Comply with manufacturer’s written installation recommendations for preparing substrates indicated to receive flooring products and accessories.
		2. Adjacent Surfaces Protection: Protect adjacent work areas and finish surfaces from damage during product installation.
		3. Surface Preparation:
			1. General: Prepare substrate in accordance with manufacturer's recommendations and ASTM industry standards. Work shall not proceed until all unsatisfactory conditions are corrected to acceptable conditions to the Owner and Architect.
			2. Substrate: Substrates to receive flooring must be structurally sound, rigid, smooth, flat, clean, and permanently dry. The substrates must be free of all foreign materials including, but not limited to, dust, solvent, paint, wax, oils, grease, residual adhesive, adhesive removers, film-forming curing compounds, silicate penetrating curing compounds, sealing, hardening or parting compounds, alkaline salts, excessive carbonation or laitance, mold, mildew, and other foreign materials that might affect the rate of moisture dissipation from the concrete, the adhesion of flooring to the concrete or cause a discoloration of the flooring from below.
			3. Concrete Substrates: Concrete substrates shall be cured per the concrete manufacturer’s recommendations. They must have a minimum compressive strength of 3,000 psi and a minimum dry density of 150 pounds per cubic foot. Refer to Division 3 Concrete Sections for patching, repairing crack materials and leveling compounds with Portland cement based compounds.
				1. Refer to Division 3 Concrete Sections for cast‑in‑place concrete, concrete toppings, and cementitious underlayments.
				2. Reference Standard: Comply with the latest version of ASTM F 710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
			4. Wood Substrates: Wood substrates must be double construction with a minimum total thickness of 1 inch. Wood substrates must be rigid, free from movement and have at least 18" of well-ventilated air space below. Forbo products should not be installed over wooden subfloors built on sleepers over on or below grade concrete floors without first making sure that adequate precautions have been taken to ensure the structural integrity of the system, and to prevent moisture migration from the concrete slab.
				1. Refer to Division 6 Carpentry Section for wood substrates and wood underlayment.
				2. Reference Standard: Comply with the latest version of ASTM F 1482 – Standard Practice for Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring.
		4. Substrate Testing: In order to ensure that the moisture condition of concrete substrates is within acceptable limits, it is essential that moisture testing be conducted and documented on ALL concrete substrates regardless of age or grade level, including those where resilient flooring has already been installed. Moisture testing should only be conducted once a stable, conditioned environment has been established in accordance with the latest version of the specified test methods. All other testing types shall be conducted on all substrate types. A diagram of the area showing the location and results of each test should be submitted to the Architect, General Contractor or End User. If at the time of testing the test results exceed the limitations set forth by the flooring manufacturer, the installation must not proceed until the problem has been corrected. The Contractor responsible for the substrate shall be responsible for the costs associated with analysis of the substrate and subsequent remediation requirements.
			1. In-situ Relative Humidity Testing: ASTM F 2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
				1. Conduct three (3) tests for the first 1,000 square feet (100 square meters) and at least one additional test for each additional 1,000 square feet (100 square meters).
				2. [The concrete internal relative humidity must not exceed 85% when using Forbo V 885 adhesive.]
				3. [The concrete internal relative humidity must not exceed 80% when using Forbo 660 adhesive.]
			2. Calcium Chloride Testing: ASTM F 1869 – Standard Test Method for Measuring Moisture Vapor Emissions Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
				1. Conduct three (3) tests for the first 1,000 square feet (100 square meters) and at least one additional test for each additional 1,000 square feet (100 square meters).
				2. [The concrete moisture vapor emissions must not exceed 8.0 lbs. per 1,000 square feet in 24 hours when using Forbo V 885 adhesive.]
				3. [The concrete moisture vapor emissions must not exceed 6.0 lbs. per 1,000 square feet in 24 hours when using Forbo 660 adhesive.]
			3. Substrate Porosity Testing: ASTM F 3131 – Standard Practice for Field Determination of Substrate Water Absorption (Porosity) for Substrates to Receive Resilient Flooring.
				1. Conduct testing in accordance with the manufacturer’s recommendations in various locations throughout the area where flooring is to be installed. Although the number of tests required may vary, enough tests should be performed to allow an evaluation of the entire area where material will be installed.
				2. Water should penetrate into the substrate within 5 – 10 minutes to be considered acceptable. If water penetrates too rapidly or too slowly, adjustments to the substrate must be made to provide the proper surface profile. Substrates determined to be overly porous, dusty or generally insufficient may need to be primed using a primer according to the manufacturer’s recommendations to regulate the porosity level of the substrate.
			4. pH testing: ASTM F 710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
				1. Conduct testing at each calcium chloride test location as the calcium chloride tests are removed.
				2. [The surface pH of the concrete must not exceed a pH of 10.0 when using Forbo V 885 adhesive. Concrete surfaces with pH readings less than 7.0 or above 10.0 will require remediation prior to installation.]
				3. [The surface pH of the concrete must not exceed a pH of 9.0 when using Forbo 660 adhesive. Concrete surfaces with pH readings less than 7.0 or above 9.0 will require remediation prior to installation.]
			5. Bond Testing
				1. Conduct testing in accordance with the manufacturer’s recommendations in various locations throughout the area where flooring is to be installed. Although the number of tests required may vary, enough tests should be performed to allow an evaluation of the entire area where material will be installed.
				2. [When evaluating adhesive mat bond tests using Forbo V 885 adhesive, significant force should be required to remove the test sample. The bond failure should occur within the adhesive layer when the test sample is removed. There should be approximately the same amount of adhesive on the substrate and the material backing.]
				3. [When evaluating adhesive mat bond tests using Forbo 660 adhesive, the point of failure during bond testing should be in the material. The anticipated result is that the material will be destroyed when removing the sample.]

*Specifier Note: Coordinate article below with manufacturer's recommended installation details and requirements.*

* 1. **INSTALLATION**
		1. Material Installation: Measure the area to be installed and determine the direction in which the material will be installed and seam placement. Seams should be a minimum of 6” away from underlayment and concrete joints, saw cuts, etc. Cut the required length for the first sheet off of the roll, adding approximately 3” - 6” for extra trimming. Fit the first sheet along the main (long) wall and at the ends using standard fitting methods. Position the fitted sheet in place against the main wall. The factory edge must be trimmed in order to produce a clean edge suitable for seaming. The Forbo Seam & Strip Cutter has been developed to efficiently and effectively trim the factory edge. In lieu of the Forbo Seam & Strip Cutter, a straight edge, utility knife and hooked blade knife may also be used. Position the straight edge approximately 1/2” - 3/4” from the factory edge and score the material using the utility knife along the straight edge. After scoring, complete the cut using a hooked blade knife following the score line. Hold the blade at a slight angle to the surface of the material so the seam edge will have a slight undercut. After trimming the seam edge, draw a pencil line on the substrate lengthwise along the trimmed edge. This line will serve as a spread line when applying the adhesive. Do not reverse sheets when installing Eternal Wood. Reverse sheets when installing Eternal Material. Immediately roll the flooring in all directions using a 100 lb. roller to ensure proper adhesive transfer. Additional rolling is required during adhesive setup to ensure that the material is flat and fully adhered. The use of a three-section wall roller or steel seam roller is required at walls, under toe kicks or anywhere the full weight of a 100 lb. roller cannot access or be applied.
		2. [Adhesive Application: Use trowel recommended by flooring manufacturer for Forbo V 885 adhesive.
			1. 1/32” x 1/16” x 1/32” fine notch trowel
			2. Spread rate is approximately 175 ft2/gallon]
		3. [Adhesive Application: Use trowel recommended by flooring manufacturer for Forbo 660 adhesive.
			1. 1/32” x 1/16” x 1/32” fine notch trowel
			2. Spread rate is approximately 150-160 ft2/gallon]
		4. Seaming: All Eternal sheet products shall be installed utilizing net fit seams. A properly executed net fit seam will have no gaps or fullness. If the material is cut too full, it will result in bubbled or peaked seams. Gaps will allow dirt or contaminants to accumulate. Cut the material at an angle so as to slightly undercut the material. This will compensate for any slight expansion that may occur. Roll the seam with a steel seam roller, making sure that the flooring material is placed into wet adhesive.
			1. Heat Welding: All Eternal sheet products require heat welded seams. Groove out the seams and heat weld together with complementary colored heat welding rod of complimentary composition in accordance with the flooring manufacturer's recommendations.
		5. [Flash Cove Installation: Extend the flooring up the wall in a flash‑coved method to a height of [4] [6] inches ([102] [152] mm), as indicated.]
		6. Installation Techniques:
			1. Where demountable partitions and other items are indicated for installation on top of finished flooring, install flooring before these items are installed.
			2. Scribe, cut, fit flooring to butt tightly to vertical surfaces, permanent fixtures and built‑in furniture, including pipes, outlets, edgings, thresholds, nosings, and cabinets.
			3. Extend flooring into toe spaces, door reveals, closets, and similar openings.
			4. Install flooring on covers for telephone and electrical ducts, and similar items occurring within finish floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on these covers.
			5. Do not install resilient flooring over expansion joints. Use expansion joint covers manufactured for use with resilient flooring. Refer to other specification sections for expansion joint covers.
			6. Adhere resilient flooring to substrate without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed installation.
				1. Use adhesive applied to the substrate in compliance with the flooring manufacturer’s recommendations, including those for proper spreading of the adhesive, adhesive missing and adhesive open and working times.
			7. Immediately roll the flooring in all directions using a 100 lb. roller to ensure proper adhesive transfer. Additional rolling is required during adhesive setup to ensure that the material is flat and fully adhered. The use of a three-section wall roller or steel seam roller is required at walls, under toe kicks or anywhere the full weight of a 100 lb. roller cannot access or be applied.
		7. Finish Flooring Patterns: [Specify patterns as selected and detailed by Architect.]

*Specifier Note: Coordinate article below with Division 1 Quality Assurance and Quality Control Sections.*

* 1. **FIELD QUALITY REQUIREMENTS**

*Specifier Note: Edit paragraph below. Establish number and duration of periodic site visits with Owner and manufacturer, and specify below. Consult with manufacturer for services required. Coordinate paragraph below with Division 1 Quality Assurance Section and Part 1 Quality Assurance Submittals herein. Delete if manufacturer's field service not required.*

* + 1. Manufacturer's Field Services: Upon request of the Owner, General Contractor or Architect, and with at least 72 hours’ notice, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's recommendations.
			1. Site Visits: [Specify number and duration of periodic site visits.]

*Specifier Note: Coordinate article below with Division 1 Execution Requirements Section.*

* 1. **PROTECTION**
		1. Protection: Do not allow heavy traffic or rolling loads for at least 72 hours following the installation. Additional time may be necessary if the installation is over a non-porous substrate. Protect installed product and finish surfaces from damage during construction. Remove and legally dispose of protective covering at time of Substantial Completion.

*Specifier Note: Coordinate article below with Division 1 Execution Requirements (Cleaning) Section.*

* 1. **CLEANING**
		1. Initial Maintenance: In order to allow the adhesive to dry and cure properly, wait a minimum of five days following the installation before conducting wet cleaning procedures or initial maintenance. Additional time may be necessary if the installation is over a non-porous substrate.
		2. Procedure:
			1. Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's recommendations prior to Owner's acceptance. Remove construction debris from project site and legally dispose of debris.
			2. Remove visible adhesive and other surface blemishes using cleaning methods recommended by floor manufacturer.
			3. Remove all surface soil, debris, sand and grit by dust mopping, sweeping or vacuuming the floor.
			4. Mix a neutral pH cleaning solution according to the label directions and apply the solution to the floor. Do NOT flood the floor. Allow the solution to dwell on the floor for 5 – 10 minutes.
			5. Scrub the floor using a 3M™ Red Buffer Pad #5100 or equivalent.
			6. Pick up the scrubbing solution with a wet vacuum or an automatic scrubber.
			7. Rinse the entire floor surface with a clean mop using clean, cool water.
			8. Allow the floor to dry thoroughly before allowing traffic.

*Specifier Note: Add or delete article below to suit project requirements.*

* 1. **INITIAL MAINTENANCE PROCEDURES**
		1. General: Include in Contract Sum Amount cost for initial maintenance procedures, and execute procedures after flooring installation as recommended by flooring manufacturer.
		2. Initial maintenance to be conducted by awarded Flooring Contractor.
			1. [Engage floor care professionals who are certified by Forbo as a “Forbo Certified Floor Care Technician.”]

*Specifier Note: Retain article below to suit project requirements. CSI PageFormat allows for Schedules, Forms, and Tables to be located at the end of a section. Article may be used to describe specific criteria requirements of similar products or equipment.*

* 1. **SCHEDULES AND (PRODUCT CRITERIA) FORMS**
		1. Schedules: [Specify reference to applicable schedules.]

**END OF SECTION 09 65 16**

Manufacturer's Obligatory Disclaimer Statement (For Electronic Media; Not Print Media)